Self-reported health complaints among general dental practitioners, orthodontists, and office employees

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Studies in the Scandinavian countries have shown that orthodontists run an equal or even greater risk of contracting dermatitis compared to other dental personnel. The aim of the study was to find out whether the self-reported occupation-related health problems of general dental practitioners and orthodontists differ from those of office employees in Finland. The subjects were 147 general dentists, 81 orthodontists and 99 office employees (77% women and 23% men). The data were collected using a mailed questionnaire. Within the past year, 42% of the subjects had had occupational health problems, while 51% had experienced symptoms in the previous year or earlier. The complaints of hand dermatoses, musculoskeletal, as well as respiratory symptoms were significantly more common among women than among men. Musculoskeletal complaints were the most common symptoms in all occupational groups, but the odds ratio of having them were significantly higher for dental professionals compared to office employees. The frequency of self-reported hand dermatoses was 42% for dental professionals and 26% for office employees, but the difference did not reach statistical significance. The odds of having hand dermatoses were higher for atopic subjects and for women. Orthodontists did not differ from general practitioners in respect of any of the complaints reported. Materials used in dentistry were mentioned as the cause of symptoms by 49 (21.5%) of the dental professionals. The present results show an increased risk of self-reported musculoskeletal symptoms for the dental professionals. Also, a tendency towards increased occurrence of skin symptoms was noted for the dental professionals compared to office employees of this study. ☐ *Dentists; dermatitis, contact; hypersensitivity; occupational health; questionnaires*

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Dental personnel are exposed to health hazards that are similar to those of other healthcare professions, but different from many other professions and the general population. The occurrence of hand dermatitis among personnel in all fields of dentistry has been found higher than in the general population, with reported frequencies from 17% to 28% for dental technicians up to 40–43% for orthodontists and personnel in the public dental service, and also higher among women than among men (1–7). In Finland, dentists are currently at the greatest risk of any occupation of developing occupational allergic contact dermatitis (8). Occupational skin hazards in dental practice include contacts with biomaterials such as dental composites, and auxiliary materials whose chemically active components can act as sensitizers. Dental composites are frequently used in orthodontics for bonding of brackets, and in general dental practice the use of adhesive resins in restorative procedures has increased along with the decreased use of amalgam. Adverse reactions attributed to dental materials have been reported for acrylates and dental bonding agents in particular, and dermatoses on the hands and fingers have been the most common occupation-related complaints among dentists (5, 9, 10, 11).

For orthodontists and dental staff in public dentistry in Norway the frequencies of self-reported dermatoses have been found to be higher than for Swedish periodontists or for prosthodontists from other Scandinavian countries (2, 3, 12, 13). Among Finnish dental personnel, corresponding questionnaire studies exist only from dental technicians (5).

Frequent hand-washing, disinfecting agents, and the use of gloves is another health hazard for dental personnel (2, 14, 15). Practicing dentists wear gloves for longer periods than any other professional group, and routine glove wearers have been found to suffer from skin irritation symptoms more than occasional glove wearers (16). Currently, dentists are at the greatest risk of any occupation of developing occupational contact urticaria caused by natural rubber latex (17).

Musculoskeletal symptoms are also attributed to dentists, but highest frequencies (68%) have been reported by dental hygienists (18–20). Static postures of long duration—sitting or standing—are characteristic of a dentist's work, and these have been found to be associated with symptoms of the neck, shoulder, and lower back (21). However, organizational and psychosocial working conditions, such as work pace, job security, job constraints, work planning, and the psychological work climate, seem to play as important a role in the occurrence of musculoskeletal symptoms as physical working conditions (21).

Table 1. Number of subjects by occupation, gender, and age

	General dental practitioner			Orthodontist			Office employee			
Age (years)	Female	Male	Total	Female	Male	Total	Female	Male	Total	Total
<30	1	–	1	–		–	8	–	8	9
30–39	46	14	60	8	3	11	25	2	27	98
40–50	36	15	51	29	9	38	36	6	42	131
50<	22	13	35	27	5	32	8	6	14	81
Total	105	42	147	64	17	81	77	14	91	319
Age or gender missing									8	8
Grand total			147			81			99	327

The aim of this study was to find out the frequency of occupation-related symptoms reported by Finnish orthodontists and general dental practitioners and to compare it with that reported by office employees in Finland. Special emphasis was directed to skin symptoms.

Material and methods

The study population consisted of general practitioners (GPs), orthodontists, and office employees. Members of the Orthodontic Division of the Finnish Dental Society living in Finland (208 members) and 141 other dentists randomly selected from a list of members of the Finnish Dental Association were selected to represent dental professionals. Because not all members of the Orthodontic Division were specialized orthodontists, the final division into orthodontists and GPs was based on the information from the questionnaire about time allocated to orthodontics in the dental practice. Dentists who worked with orthodontics during half or more of their clinical time were categorized as orthodontists. The other group consisted mainly of GPs and a few specialists from other fields of dentistry.

All office employees (140) working in a variety of jobs at the central office of the Hyvinkää municipal organization in Finland were chosen to represent population other than health workers.

After a reminder, a total of 334 (68%) completed questionnaires were returned. Three dentists were excluded due to not having practiced clinical dentistry, and, similarly, four office employees were excluded because they worked as cleaners. The final number of study subjects was 327; 147 GPs, 81 orthodontists, and 91 office employees, out of which 77% were women and 23% men (Table 1). Their ages ranged from 19 to 78 years, 98% of the subjects being between 26 and 66 years of age. The gender of the respondent was missing in seven cases and the year of birth in two cases. These cases were omitted from the analyses where age or gender was included. Five orthodontists had retired, but since their answers to the questionnaire were based on their last years of work, they were included in the study.

The data were collected in 1993 through a questionnaire mailed to all selected subjects. The questions were applied from those by Jacobsen and Hensten-Pettersen in 1989 (2) and contained personal data on age, gender, profession, length of time in the occupation, and working time, either part-time or full time work. Questions on health dealt with general allergies and occupation-related symptoms, listed as skin symptoms, neurological symptoms, symptoms of the respiratory tract, musculoskeletal symptoms and general symptoms like nausea, headache, and dizziness. A question about experience of any occupational health problem during the previous 12 months was included. Otherwise, in the case of individual occupation-related symptoms the questions were asked on a life-time basis. Specifications referring to the location and nature of skin or other health problems were given. Questions were asked about symptoms associated with certain chemicals or working procedures, and working versus free time. In addition, the dentists were asked about the use of protective gloves, the frequency of handwashing, and self-manufacturing of acrylic items and plaster models.

In the first stage of analysis the chi-square test was used for the entire study population. To control the uneven distribution of age and gender among the occupational groups, a multivariate logistic regression analysis (SPSS for Windows release 7.5.1) was used for examining differences in the occurrence of various symptoms in relation to different background factors, particularly occupational status. Odds ratios (OR) with their 95% confidence intervals (95% CI) were computed for each independent background factor (age, gender, occupational group, years at work and atopy). Atopy was defined when a person had a history of flexural dermatitis, allergic rhinitis, or asthma.

Results

Forty-one percent of all respondents had had some occupational-related health problem during the previous year. The life-time prevalence (past year or earlier) of occupational-related health complaints was 51%, and they were significantly more common among women than among men, 59% and 30%, respectively (chi-square = 18.43, d.f. = 1, $P < 0.001$).

One-third of the subjects (36%) reported allergic

Table 2. Odds ratios (OR) and upper and lower boundaries of 95% confidence interval (CI) for background (independent) variables when hand dermatoses, neurologic symptoms, dizziness, respiratory symptoms, headache, and musculoskeletal symptoms are as dependent variables in a logistic regression model. Age and years at work are continuous variables whereas all the others are dichotomized

	Dependent variables					
Independent variables	Hand dermatoses OR	Neurologic symptoms OR	Dizziness OR	Musculoskeletal symptoms OR	Headache OR	Respiratory symptoms OR
Age						
95% CI	1.01	1.00	1.00	0.97	1.01	1.03
Lower	0.95	0.93	0.91	0.92	0.95	0.98
Upper	1.07	1.07	1.10	1.03	1.08	1.09
Years at work						
95% CI	0.98	1.01	0.97	1.03	0.96	0.99
Lower	0.92	0.94	0.88	0.97	0.90	0.93
Upper	1.05	1.09	1.07	1.09	1.02	1.05
Atopy						
95% CI	2.65*	1.41	1.47	1.54	1.95*	3.05*
Lower	1.53	0.73	0.59	0.91	1.11	1.83
Upper	4.60	2.70	3.70	2.60	3.43	5.09
Orthodontist						
95% CI	1.12	0.91	0.60	1.06	0.60	0.75
Lower	0.52	0.42	0.16	0.59	0.29	0.40
Upper	2.17	1.97	2.22	1.91	1.27	1.38
Office employee						
95% CI	0.56	0.77	2.01	0.56*	1.69	4.77*
Lower	0.29	0.36	0.78	0.32	0.92	2.66
Upper	1.07	1.62	5.21	0.96	3.09	8.55
Female gender						
95% CI	3.57*	1.47	0.59	2.00*	1.92	2.50*
Lower	1.56	0.67	0.29	1.16	0.77	1.30
Upper	8.33	3.33	2.50	3.45	4.17	5.00

*Statistically significant at 0.05 level.

rhinitis, asthma, allergic eczema, or some other allergic symptom. The frequency of reporting allergic symptoms did not differ between the genders.

Musculoskeletal symptoms

Musculoskeletal complaints were the most common symptoms in all occupational groups. Reported life-time prevalences for orthodontists, GPs and office employees were 72%, 70% and 60%, respectively. These symptoms were reported significantly more often by women than by men, the odds ratio being 2.0 (Table 2). The office employees had significantly fewer of these symptoms (OR = 0.56) than the dentists (GPs and orthodontists pooled together), whereas being an orthodontist did not significantly affect the odds of any variable studied. Age or years at work did not have a significant effect on the occurrence of these or any other of the symptoms reported.

The neck (53%) and shoulders (56%) were the sites most often involved, followed by back pain (28%) and arms and hands (17%). Elbows, wrists, and finger joints were less frequently reported as a location of musculoskeletal symptoms.

Hand dermatoses

Hand dermatoses were the second most common health problem in the dental profession, both among GPs (42%) and orthodontists (42%). The back of the hand and the fingers were common locations of dermatoses. Redness, itching, and chapping were the most common complaints. The odds of having hand dermatitis were significantly higher for women and for atopics, but no significant differences between occupations were observed (Table 2). For the office employees, the reported prevalence of hand dermatoses was 26%, located most commonly in fingers or/and on the back of the hand and with manifestations similar to that of the dental professionals.

In the dental profession 91 (40%) respondents used gloves regularly. Vinyl gloves were only used by 57% of the glove-users; the rest used either natural rubber latex (NRL) gloves or both NRL and vinyl gloves. Hand dermatitis was reported by 58% of the women using gloves and 44% of the women not using gloves, but the difference was not statistically significant.

The majority (75%) of dental professionals washed their hands more than 20 times/day, and 25% reported to wash their hands more than 40 times/day. Among the office employees, the frequency of hand washing was significantly lower, 89% reported the frequency less than 10

times/day. The prevalence of hand dermatoses was not significantly related to the frequency of hand washing.

Respiratory symptoms

Occupation-related respiratory symptoms were reported by 52% of the office employees, by 28% of the orthodontists, and by 18% of the GPs. The odds of having these symptoms were significantly higher for women (OR = 2.50) and for office employees (OR = 4.77). Cough, a blocked or runny nose, bronchitis, and difficulties in breathing were the most common respiratory complaints. Two-thirds (63%) of the subjects with respiratory symptoms attributed the reaction to dry air and 17% to the handling of a specific material. Dry and dusty air due to central heating and air conditioning was considered the main reason for the respiratory problems among the office employees.

Neurological symptoms

The three most commonly reported neurological symptoms were numbness (37 subjects) and pricking of the fingers (19 subjects), and "white fingers" (10 subjects). In a few cases numbness of the whole hand or partial paresis was reported. The respondents in association with the neurological symptoms commonly mentioned "tension neck". The odds ratio for neurological symptoms did not differ between genders or occupational groups (Table 2).

Headache

Twenty-seven percent of the office employees and 18% of the dentists (GPs and orthodontists pooled together) reported headache, but the odds ratios for gender or occupational group did not show significant differences (Table 2). The history of atopy increased the odds almost double-fold (Table 2).

Dental materials

Materials used in dentistry were considered to cause symptoms by 49 (21.5%) of the dentists (GPs and orthodontists pooled together). (Meth)acrylates and NRL gloves were the two most commonly reported causes for symptoms which were mainly of a dermatological or respiratory nature (Table 3). The adverse effects of acrylates were attributed to both the monomer during the handling process of the material and to acrylic dust during grinding of acrylic appliances. In one case, merely staying in the room where dental composites or acrylates had been handled, induced a respiratory reaction. None of the office employees attributed their respiratory symptoms to handling of certain materials.

Table 3. Specific occupation-related factors reported by the dental professionals in association with skin or respiratory symptoms. Total number of subjects with symptoms ($n = 49$)

Factor	No. of complaints
(Meth)acrylates	14
Natural rubber latex gloves	13
Face mask	6
Detergents at work	5
Dental composites	5
Iodoform	1
Eugenol	1
Gypsum (plaster)	1
Disinfecting spray	1
Instruments	1
'Sandblast'	1

Severity of the occupation-related health problems

The occupation-related health problems were classified as severe by 34 (13%), moderate by 120 (45%), and slight by 111 (41%) respondents. Only two men (3%) assessed their health problem to be severe compared to 13% of the women (chi square = 6.90, d.f. = 1, $P < 0.001$).

Discussion

The dental professionals of this study represent Finnish dentists and orthodontists as a whole. The high proportion of women reflects well the general gender distribution among Finnish dentists. Office employees were chosen as a control group, because they generally are not exposed to chemically active, sensitizing or irritating materials, or to continuous hand-washing in their work.

The number of subjects in this study was small, particularly the number of orthodontists. It was not feasible to increase this group, as already all the members of the Finnish Orthodontic Society were contacted, out of which 72% responded. Unfortunately, many of them had to be transferred from the orthodontist group into the general practitioner group based on set criteria. Hence, the sample can be regarded as representative of the Finnish orthodontists and those non-specialists working mainly within clinical orthodontics. Nevertheless, the limited sample size inevitably affects the power of the study in detecting differences of smaller magnitude, which has to be considered when interpreting the results.

In cross-sectional studies on occupational health, there is always a possibility of the 'health-worker effect', i.e. severe cases might have been missed, since they have stopped work due to the symptoms. As far as hand dermatoses are concerned, it could be assumed that this would be more likely among the dental personnel, as healthy hands are a prerequisite for aseptic clinical work. The study design allowed these cases to be included in the dental groups but not in the office employee group, as sampling of

orthodontists and general practitioners was based on the register of the Dental Society; the questionnaire also included the life-time experience of occupational problems.

Questionnaire investigations dealing with self-evaluated adverse reactions and symptoms carry basic difficulties with respect to the respondents' subjectivity in observing and assessing sometimes vague reactions. In spite of these reservations, self-reported information obtained with questionnaires is important in collecting information on dental biomaterials, since only a few of the most severe reactions are publicized in case reports and become officially registered, while milder occupation-related symptoms are generally not noticed. Data collected in this study are for the same time period 1992–94 as the latest data, published in 1999 from the Finnish Register of Occupational Diseases, date back to (8).

The response rate (68%) was mainly in accordance or even a little higher compared to many previous questionnaire studies (2, 12, 13, 16) and can be considered adequate, although some relevant information may have been lost.

The difference between 1-year prevalence and life-time prevalence of self-reported occupational health complaints was minor (41% vs 51%) in this study. It therefore looks like most of the symptoms also occurred quite recently and should be relevant to the present situation. Many of the reported milder symptoms, such as musculoskeletal or skin symptoms, can exist periodically depending on varying physical and/or mental stress and work load, and they may still be relevant irrespective of the fact that they have not manifested during the last 1-year period. The validity of life-time prevalence, however, is lower, because people tend to forget events of less relevance over a long time span.

The reported occupational health problems were similar among orthodontists and GPs. The most common complaint—musculoskeletal symptoms—was common to all three occupational groups, although the odds were higher for the dental professionals.

Musculoskeletal disorders are widespread among the general population, and it is often difficult to distinguish between occupational and non-occupational problems (22). In dentistry, musculoskeletal complaints of varying severity have been found most commonly among dental hygienists (62–80%), who generally work without assistance (20, 23), while musculoskeletal complaints reported by dentists in other studies have been less, from 36% to 42% (18, 19, 24). In this study the prevalence of musculoskeletal complaints was exceptionally high in all professional groups compared to earlier reports.

Comparisons between studies must be carried out with caution, however. The life-time prevalence used in this study gives higher figures than studies including 1-year prevalences. In addition, modern office work with visual display units causes ergonomic problems which can be considered similar to those in dental work (working with arms lifted, repetitive movements demanding precision), which have been found to be risk factors in neck and shoulder disorders, and that may explain the high frequency of complaints among the office personnel, too (21).

The frequency of irritant hand dermatitis among dentists (42%) is in accordance with previous studies (2–4, 7, 14, 25, 26), whereas the office employees of this study reported higher frequencies of irritant hand dermatitis (26%) than those reported in the general population. The difference in the frequency of hand dermatitis between dental profession and office employees can be noted, regardless of its statistical non-significance, which may be related to the insufficient power due to the small number of subjects. Specific materials used in dentistry were associated with skin symptoms by only 21.5% of the dentists. Thus, part of the hand dermatoses could have been of an irritant nature, due to for example frequent hand-washing and non-occupational factors like dry air. On the other hand, it is well known that allergic contact dermatitis cannot be diagnosed without patch testing. Specific materials may have been the cause of dermatitis, although the subjects were unaware of the cause. Therefore, because of the growing frequency of occupational allergic dermatitis in Finnish dentists, continuously increasing emphasis has been focused on educating dental personnel in the prevention of these health hazards (8). Many dentists also indicated in the questionnaire that their hands were better in the summer. This could be a result of less work at this time of the year, or the effect of the sun and other climatic factors.

In this study female gender and atopy were the only dominant variables as regards hand dermatoses. Atopic disposition as well as gender have also previously been found as risk factors in hand dermatoses among dentists, farmers, and in the general population (6, 27–30). Also, adverse skin reactions to latex glove-wearing have been reported as more likely to occur among dentists with a personal history of atopy (31).

Men estimated their health problem to be severe significantly less often than women did. However, this study design, which is based on self-evaluation, does not allow one to distinguish between true health differences and differences in the experience of similar health conditions between genders.

Respiratory symptoms and headache were the only health complaints that were more frequently reported by the office employees than by the GPs and orthodontists. The office workers of this study attributed many of their respiratory symptoms to air-conditioning and wall-to-wall carpeting, which were considered by many respondents as the main occupational health hazards of the municipal central office building where most of the respondents worked. For hygienic reasons, dental offices in Finland do not have wall-to-wall-carpeting and the importance of well-designed and efficient air-conditioning is emphasized for the same reason, but also for the potential health hazard attributed to handling of some chemically active dental materials in the office. Also, dental offices are

generally smaller units than office buildings, and so there is more flexibility to adjust the air-conditioning to meet the needs of concerned people.

The present results showed that the dental profession did not significantly increase the occurrence of self-reported skin symptoms compared to office personnel. However, a tendency in that direction was clearly seen in the results and therefore could be considered to be in line with the data in the Finnish Register of Occupational Diseases (8). It may also be that mild symptoms are unnoticed, which calls for further counseling of the work-related risks associated with the dental materials. Moreover, there is a need for studies where the questionnaire is supplemented with a clinical examination.

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